**How to Make a Simple Hover Craft**

**Emmette Cox  
Product Management Coordinator for Physical Science (Courtesy of Carolina Tips)**

In first year physics many of the problems ignore friction. Why? Friction tends to complicate things in physics problems. It does this in real life also, but in real life it can’t be ignored. A lot of time is spent trying to minimize friction. The following demonstration shows just how much difference friction makes.

  
**Figure 1**

**Materials**

* Balloons
* Dishwashing liquid bottle cap
* Used compact disc (CD)
* Hot glue gun and glue (works better than white or rubber cement glue)

**Safety**

**Note: *This activity should not be performed by anyone with latex allergies.***

Follow the instructions for this activity closely and abide by established laboratory safety practices, including the use of appropriate personal protective equipment (PPE) such as gloves, chemical splash goggles, and lab coats or aprons. Do not eat, drink, or chew gum while performing the lab and wash your hands before and after performing the activity.

Use caution when using strong adhesives or hot glue. The bottom of the soap bottle cap should be directly over the hole in the CD.

**Procedure**

1. Remove the cap from a liquid dishwashing detergent bottle.
2. Put a small ring of hot glue around the bottom edge. Before the glue dries, quickly center the cap over the hole in the CD and press down.
3. Allow the glue to dry. Drying overnight is preferred.   
   **Note:** *Using a cap with a pull-up stopper (see Figure 1), you can attach an inflated balloon and "turn off" the hover craft by pushing down on the stopper thus closing off the air from the balloon.*
4. Inflate a balloon. Hold the end closed and slip the end of the balloon over the bottle cap.
5. Place the entire assembly on the floor.
6. Release the balloon and slide the CD.
7. Compare the motion of the CD while the balloon is deflating with the motion of a CD with a deflated balloon or no balloon.

**Explanation**

What’s the difference? The deflating balloon creates a cushion of air under the CD therefore reducing friction and allowing the CD to move more freely. Based on the level of student understanding you may want to extend the lesson to discuss collisions.

Ask students to think of real world applications where minimal friction is important. What would happen if we couldn’t reduce friction? Answers might include:

* **Skiing, skating or sledding**  
  Moving across snow would be more difficult if we couldn’t slide across the snow with a sled or on skis.
* **Machines**  
  Without oil for lubrication almost none of the machines we use would work. That includes cars, trains, electric motors and generators. Even most of the doors we walk through have oil in the hinges so that we can open them. Eliminating friction is an important factor in the design of almost every machine.
* **Sports**  
  How much fun would bowling, curling or shuffleboard be without minimizing friction?

**Extension**

**Model the relationship between gas molecules and volume**

Have all your students form a huge circle in the gym and slide their CD’s all at once. Next, form a smaller circle and slide the CD’s again. What do you observe? What can this tell you about gas molecules and volume? When the space is smaller the number of collisions should increase.Top of Form